

7-8 Inverse Functions and Relations

ex:
 $y = 3x$

(1, 3)

(2, 6)

Change equation so that you would
 get (3, 1) and (6, 2).

$$y = \frac{1}{3}x$$

ex:

$$y = x + 5$$

(1, 6)

(2, 7)

(6 , 1)

(7 , 2)

$$y = x - 5$$

ex:

$$y = 3x - 1$$

(0, -1)

(2, 5)

$$y = \frac{x+1}{3}$$

(-1 , 0)

(5 , 2)

These equations are inverses of one
 another
 (switching of x and y)

Using function notation:

$$f(x) = 3x - 1 \qquad f^{-1}(x) = \frac{x+1}{3}$$

If $f(a) = b$, then $f^{-1}(b) = a$.

$$f(0) = -1$$

$$f^{-1}(-1) = 0$$

$$f(2) = 5$$

$$f^{-1}(5) = 2$$

Given the relation:

$$\{(3, 3) (2, 5) (-2, 5) (-2, 2) (-1, 2) (-1, 3)\}$$

Find the inverse relation.

$$\{(3, 3) (5, 2) (5, -2) (2, 2) (2, -1) (3, -1)\}$$

Finding the inverse.

ex:

$$f(x) = \frac{-1}{2}x + 1$$

$$y = \frac{-1}{2}x + 1$$

$$x = \frac{-1}{2}y + 1$$

$$x - 1 = -\frac{1}{2}y$$

$$-2x + 2 = y$$

1. change to $y =$ 2. switch x and y 3. solve for y 4. change to $f^{-1}(x) =$

$$f^{-1}(x) = -2x + 2$$

Find the inverse:

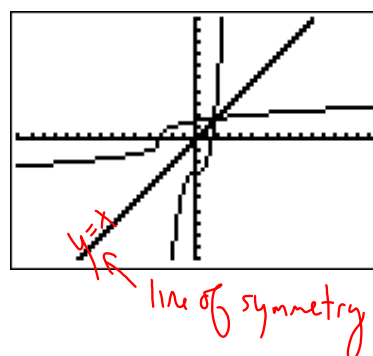
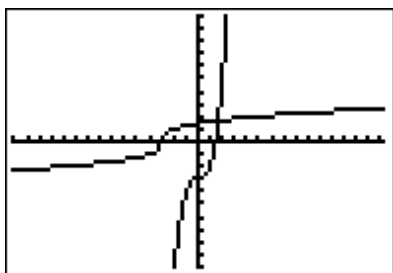
$$1. f(x) = \frac{3}{4}x - 6 \quad f^{-1}(x) = \frac{4}{3}(x+6)$$

$$2. g(x) = \frac{x+2}{3} \quad g^{-1}(x) = 3x-2$$

$$3. f(x) = x^3 - 3 \quad f^{-1}(x) = \sqrt[3]{x+3}$$

After finding the inverse, graph #3 and the inverse on your calc





MEMORY	
1:	ZBox
2:	Zoom In
3:	Zoom Out
4:	ZDecimal
5:	ZSquare
6:	ZStandard
7↓	ZTrig



Graph the relation and its inverse:

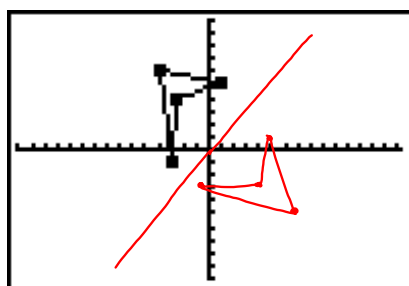
$\{(1, 5) (-4, 6) (-3, -1) (-2.5, 4)\}$

L1	L2	L3	3
1	5		
-4	6		
-2.5	4		
1	5		
L3(1)=			





Plot1	Plot2	Plot3
Off		
Type:   		
Xlist: L1		
Ylist: L2		
Mark:  + .		

```

ZOOM MEMORY
1: ZBox
2: Zoom In
3: Zoom Out
4: ZDecimal
5: ZSquare
6: ZStandard
7: ZTrig
  
```



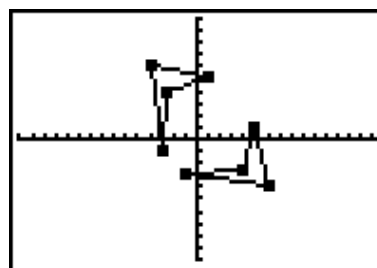
$(5, 1) (6, -4) (-1, -3) (4, -2.5)$

Plot1	Plot2	Plot3
Off		
Type:   		
Xlist: L2		
Ylist: L1		
Mark:  + .		

```

ZOOM MEMORY
1:ZBox
2:Zoom In
3:Zoom Out
4:ZDecimal
5:ZSquare
6:ZStandard
7↓ZTrig

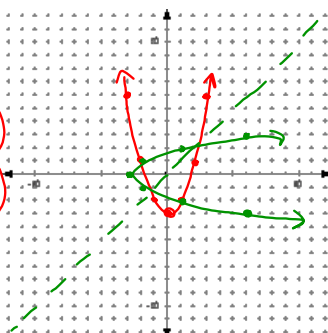
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Sketch the inverse.

$$y = x^2 - 3$$

$(0, -3)$ $(3, 6)$
 $(1, -2)$ $(-3, 6)$
 $(-1, -2)$
 $(2, 1)$
 $(-2, 1)$



Show that two functions are inverses of one another

Two functions are inverses of each other iff the composition is the identity function.

$$I(x) = x$$

$$[f \circ g](x) = x$$

$$[g \circ f](x) = x$$

Show $f(x) = \frac{-1}{2}x + 1$ $g(x) = -2x + 2$ are inverses.

Do:

$$\begin{aligned} [f \circ g](x) &\stackrel{?}{=} x & [g \circ f](x) &\stackrel{?}{=} x \\ f(-2x+2) & & g\left(-\frac{1}{2}x+1\right) & \\ -\frac{1}{2}(-2x+2) + 1 & & -2\left(-\frac{1}{2}x+1\right) + 2 & \\ x - 1 + 1 & & x - 2 + 2 & \\ x &= x \checkmark & x &= x \checkmark \end{aligned}$$

HW p393
15-27odd
32, 33